DOCUMENT RESUME

ED 101 430 EA 006 707

AUTHOR	Hebert, Budd H.; Murphy, Elaine
TITLE	Network Analysis: A Selected Bibliography. Exchange Bibliography No. 165.
INSTITUTION	Council of Planning Librarians, Monticello, Ill.
PUB DATE	Dec 70
NOTE	31p.
AVAILABLE FROM	Council of Planning Librarians, P.O. Box 229, Monticello, Illinois 61856 ($3.00)
EDRS PRICE	MF-$0.76 HC-$1.95 PLUS POSTAGE
DESCRIPTORS	*Bibliographies; Efficiency; *Graphs; Mathematical Applications; *Mathematics; *Networks; Operations Research; Research; *Topology
IDENTIFIERS	Graph Theory; *Network Analysis

ABSTRACT

This bibliography presents a series of studies that focus on the topic of networks and on the manner in which they have been considered in the literature. Each section of the bibliography provides a working set of references for one of the five major areas of research in which network analysis has been used. The first section deals primarily with specifying the physical structure of networks. Theoretical work describing various relationships between nodes and arcs are listed as well as more empirical work that has utilized and extended this initial body of theory. The second section presents material dealing with the general problem of optimizing flows through a given network. The third section considers theoretical work that has been done to enumerate the total number of possible graphs of a system, given a set of nodes and a set of arcs. The fourth section looks at applied studies that use the theory of graphs in an attempt to derive "optimal" networks. Finally, the last section presents a series of studies that deal with the problem of seeking optimal routes through a network. (Author/DN)

ED101430

BEST COPY AVAILABLE

Council of Planning Librarians EXCHANGE BIBLIOGRAPHY

December 1970

165

NETWORK ANALYSIS: A SELECTED BIBLIOGRAPHY

Budd H. Hebert, Assistant Professor, Department of Geography, University of Cincinnati
Elaine Murphy, Assistant, Department of Geography, University of Cincinnati

EA 006 707

Mrs. Mary Vance, Editor
Post Office Box 229
Monticello, Illinois 61856

COUNCIL OF PLANNING LIBRARIANS Exchange Bibliography #165

NETWORK ANALYSIS: A SELECTED BIBLIOGRAPHY

by

Budd H. Hebert & Elaine Murphy

Department of Geography
University of Cincinnati

Most of the work undertaken within the relatively new research area of Network Analysis relies very heavily upon a body of theory within topology known as graph theory. Many different types of problems are capable of being solved using this theory. Basic to all such problems is some type of graph consisting of a set of nodes connected by a set of arcs. Each of these arcs may be nominally scaled, representing connection or non-connection, or they may be weighted on the basis of some predetermined criteria so that importance of a connection may be ascertained. Such specification of a network or graph has facilitated use of the theory of graphs within at least five major areas of research. It is the intention of the bibliography to provide a working set of references within each of these areas. The list of references is by no means comprehensive in nature; that was not the intended design of the bibliography. With the recent increase in the numbers and types of studies dealing with networks, a need seems to have arisen for a compilation of some of the more visible work. This, then, is an attempt to present a series of studies which focus upon the topic of networks and the manner in which they have been considered in the literature.

As mentioned in the above statement the references will be divided into five sections. Because of the type of study some will be cross-referenced in one or more of the sections. Hopefully, this will

facilitate use of the bibliography. The five sections are titled:

I. Network Structure

II. Network Flows

III. Random Graphs

IV. Network Design

V. Network Routing

The first section deals primarily with specifying the physical structure of networks. Theoretical work describing various relationships between nodes and arcs are listed as well as more empirical work which has utilized and extended this initial body of theory. The second section presents material dealing with the general problem of optimizing flows through a given network. The basic problem can most succinctly be stated as follows. Given a network connecting a set of points, where each connection has a capacity constraint (or a set of constraints including cost and travel time), the problem is to select two cities and find the maximal amount of flow possible from one of the cities to the other using the entire given network. The third section is much more limited in scope than the other four; empirical work within this area is relatively unknown. Given a set of nodes and a set of arcs, this body of theory attempts to enumerate the total number of possible graphs of the system. The fourth section has recently arisen within a more applied context. Most of these studies use the theory of graphs in an attempt to derive "optimal" networks. Finally, in the last section are presented a series of studies which deal with the problem of seeking optimal routes through a network.

I. NETWORK STRUCTURE

Alao, Nurudeen. "A Note on the Solution Matrix of a Network." Geographical Analysis, Vol. 11, No. 1, (1970), 83-88.

Albert, A. A. "Rational Normal Matrices Satisfying the Incidence Equation." Proceedings of the American Mathematical Society, Vol. 4, (1953), 554-559.

Archbold, J. W. "Incidence Matrices." Mathematika, Vol. 7, No. 13, (1960), 41-49.

Archbold, J. W., and Smith, C. A. B. "An Extension of a Theorem of König on Graphs." Mathematika, Vol. 9, No. 17, (1962), 9-10.

Avondo-Bodino, Giuseppe. Economic Applications of the Theory of Graphs. New York: Science Publishers, (1962).

Beckmann, M. "Principles of Optimum Location for a Transportation Network." Paper presented at NASNRS Symposium on Quantitative Problems in Geography, (1960).

Beineke, L., and Harary, F. "On the Thickness of the Complete Graph." Bulletin of the American Mathematical Society, Vol. 70, No. 4, (1964), 618-620.

Beineke, L. W., and Harary, F. "The Connectivity Function of a Graph." Mathematika, Vol. 14, No. 28, (1967), 197-202.

Berge, Claude. The Theory of Graphs and its Applications. Translated by Alison Doig. New York: John Wiley and Sons, Inc., (1962).

Berge, Claude. "Two Theorems in Graph Theory." Proceedings of the National Academy of Science, U.S.A., Vol. 43 (1957), 842-844.

Berge, Claude, and Ghouila-Houri, A. Programming, Games, and Transportation Networks. New York: John Wiley and Sons, Inc., (1965).

Beshers, James M., and Laumann, Edward O. "Social Distance: A Network Approach." American Sociological Review, Vol. 32, No. 2 (1967), 225-236.

Black, William R. "Growth of the Railway Network of Maine." Department of Geography, Discussion Paper No. 5. Iowa City: The University of Iowa.

Bose, R. C. "Strongly Regular Graphs, Partial Geometrics and Partially Balanced Designs." Pacific Journal of Mathematics, Vol. 13, (1963), 389-419.

Boyce, David E. The Generation of Synthetic Transportation Networks. Contract DA 44-177-[illegible]-685. Fort Eustis, Va.: U. S. Army Transportation Research Command, (1963).

Bruck, R. H. "Finite Nets II, Uniqueness and Embedding." Pacific Journal of Mathematics, Vol. 13, (1963), 421-457.

Burton, Ian. "Accessibility in Northern Ontario: An Application of Graph Theory to a Regional Highway Network." Unpublished Research Paper.

Busacker, Robert G., and Saaty, Thomas L. Finite Graphs and Networks: An Introduction with Applications. New York: McGraw-Hill Book Co., (1965).

Carlitz, L., and Riordan, J. "The Number of Labeled Two-Terminal Series-parallel Networks." Duke Mathematical Journal, Vol. 23, No. 1, (1956), 435-46.

Cayley, A. The Collected Mathematical Papers of A. Cayley. Cambridge, Massachusetts: Cambridge University Press, 1889-1897.

Chartrand, Gary. "A Graph-Theoretic Approach to a Communications Problem." SIAM Journal on Applied Mathematics, Vol. 14, No. 5, (1966), 778-781.

Chen, W. K. "On Directed Trees and Directed K-Trees of a Digraph and Their Generation." SIAM Journal of Applied Mathematics, Vol. 14, No. 3, (1966), 550-560.

Chen, W. K. "On the Generation of Non-Singular Submatrices and Their Corresponding Subgraphs." Paper presented at the Allerton Conference on Circuit and System Theory, October 1966.

Cherry, E. Colin. "Generalized Concept of Networks." Proceedings of the Symposium on Information Networks. New York: Polytechnic Institute of Brooklyn, (1954), 175-184.

Chien, R. T. "Synthesis of A Communication Net." IBM Journal of Research and Development, Vol. 4, No. 3, (1960), 311-320.

Cowan, P. and Fine, D. "On the Number of Links in a System." Regional Studies, Vol. 3, No. 3, (1969), 235-242.

Crowell, R. H. "Graphs of Linear Transformations Over Finite Fields." Journal of SIAM, Vol. 10, No. 1, (1962), 103-112.

Dantzig, G. B., Blattner, W. O., and Rao, M. R. "Finding A Cycle in a Graph with Minimum Cost to Time Ratio with Application to a Ship Routing Problem." Operations Research House, Technical Report No. 66-1. Stanford, California: Stanford University, November 1966.

Dantzig, G. B., and Ramser, J. H. "The Truck Dispatching Problem." Management Science, Vol. 6, No. 1, (1959), 80-91.

Desler, J. F., and Hakimi, S. L. "A Graphy-Theoretic Approach to a Class of Integer-Programming Problems." Operations Research, Vol. 17, No. 6, (1969), 1017-1033.

Deuell, D. R., and Gill, A. "Some Decision Problems Associated with Weighted, Directed Graphs." SIAM Journal on Applied Mathematics, Vol. 14, No. 5, (1966), 970-979.

Dicker, Daniel. "Analysis of Distributed Parameter Networks-A General Method." SIAM Journal on Applied Mathematics, Vol. 14, No. 6, (1966), 1446-1453.

Dirac, G. A. "Some Theorems on Abstract Graphs." Proceedings of the London Mathematical Society, Third Series, Vol. 2, No. 5, (1952), 69-81.

Dulmage, A. L., and Mendelsohn, N. S. "Coverings of Bipartite Graphs." Canadian Journal of Mathematics, Vol. 10, (1958), 517-534.

Dulmage, A. L., and Mendelsohn, N. S. "Two Algorithms for Bipartite Graphs." Journal of SIAM, Vol. 11, No. 1, (1963), 183-194.

Durbin, E. P. "An Interdiction Model of Highway Transportation." Research Memorandum 4945-PR. Santa Monica, California: The Rand Corporation, May 1966.

Edmonds, J. "Paths, Trees, and Flowers." Canadian Journal of Mathematics, Vol. 17, No. 3, (1965), 449-467.

Ellis, D. O., and Robacker, J. T. "Concerning Growth of the Number of Distinct Cuts." Research Memorandum 1548. Santa Monica, California: The Rand Corporation, July 1955.

Elmaghraby, Salah E. "An Algebra for the Analysis of Generalized Activity Networks." Management Science, Vol. 10, No. 3, (1964), 494-514.

Erdös, P. "On Circuits and Subgraphs of Chromatic Graphs." Mathematika, Vol. 9, No. 18, (1962), 170-175.

Erdös, P., Harary, F., and Tutte, W. "On the Dimension of a Graph." Mathematika, Vol. 12, No. 24, (1965), 118-122.

Erdös, P., and Katona, G., eds. Theory of Graphs. Proceedings of the Colloquium held at Tihany, Hungary, September 1966. New York: Academic Press, 1968.

Erdös, P., and Stone, A. H. "On the Structure of Linear Graphs." Bulletin of the American Mathematical Society, Vol. 52, (1946), 1087-1091.

Fiedler, Miroslav, ed. Theory of Graphs and Its Applications. Proceedings of the Symposium held in Smolence, June 1963. Prague: Publishing House of the Czechoslovak Academy of Sciences, 1964.

Flament, Claude. Applications of Graph Theory to Group Structure. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1963.

Friedman, Bernard. "An Approach to Nonlinear Networks." Mathematics Research Laboratory, Mathematical Note No. 325. Boeing Scientific Research Laboratories, September 1963.

Ford, G. W. "On the Theory of Linear Graphs, with Applications to the Theory of Condensation." Ph.D. dissertation, University of Michigan, 1954.

Garrison, William L. "Connectivity of the Interstate Highway System." Papers and Proceedings of the Regional Science Association, Vol. 6, (1960), 121-137.

Garrison, W. L., and Marble, D. F. Approaches to the Development of a Forecasting Capability for National and Regional Transportation Systems. Contract DA 44-177-TC-685. Fort Eustis, Virginia: U. S. Army Transportation Research Command, 1962.

Garrison, W. L., and Marble, D. F. A Prolegomenon to the Forecasting of Transportation. Washington, D.C.: U. S. Department of Commerce, 1965.

Garrison, W. L., and Marble, D. F. "Factor-Analytic Study of the Connectivity of a Transportation Network." Papers and Proceedings of the Regional Science Association, European Congress, Lund, 1963, Vol. 12, (1964), 231-238.

Garrison, W. L., and Marble, D. F. The Structure of Transportation Networks. Washington, D.C.: U. S. Department of Commerce, Office of Technical Services, 1961. (Report to the U. S. Army Transportation Research Command under contract DA-44-177-TC-685.)

Gilbert, E. N., and Pollak, H. O. "Steiner Minimal Trees." SIAM Journal on Applied Mathematics, Vol. 16, No. 1, (1968), 1-29.

Gomory, Ralph E., and Hu, T. C. "Synthesis of a Communication Network." Journal of SIAM, Vol. 12, No. 2, (1964), 348-369.

Haggett, Peter. Locational Analysis in Human Geography. London: Edward Arnold, Ltd., 1965. 236-240, 251-253.

Haggett, Peter. "Network Models in Geography." Models in Geography. Edited by Richard J. Chorley and Peter Haggett. London: Methuen and Co., Ltd., 1967.

Hakimi, S. L. "On the Degrees of the Vertices of a Directed Graph." Journal of the Franklin Institute, Vol. 279, No. 4, (1965), 290-308.

Hakimi, S. L. "On Realizability of a Set of Integers as Degrees of the Vertices of a Linear Graph-I." Journal of SIAM, Vol. 10, No. 3, (1962), 496-507.

Hakimi, S. L. "On Realizability of a Set of Integers as Degrees of the Vertices of a Linear Graphy-II Uniqueness." Journal of SIAM, Vol. 11, No. 1, (1963), 135-147.

Hakimi, S. L., and Deo, N. "A Topological Approach to the Analysis of Linear Circuits." Paper presented at the Allerton Conference on Circuit and System Theory, October 1966.

Haider, Alan K. "The Method of Competing Links." Transportation Science, Vol. 4, No. 1, (1970), 36-51.

Hammersley, J. M. "On Steiner's Network Problem." Mathematika, Vol. 8, No. 16, (1961), 131-132.

Harary, F. A Seminar on Graph Theory. New York: Holt, Rinehart, and Winston, 1967.

Harary, Frank. "Graph Theoretic Methods in the Management Sciences." Management Science, Vol. 5, No. 4, (1959), 387-403.

Harary, Frank. "On Local Balance and N-balance in Signed Graphs." Michigan Mathematical Journal, Vol. 3, No. 1, (1955-1956), 37-41.

Harary, Frank. "On the Notion of Balance of a Signed Graph." Michigan Mathematical Journal, Vol. 2, (1953-1954), 143-146.

Harary, Frank. "Status and Contrastatus." Sociometry, Vol. 22, No. 1, (1959), 23-43.

Harary, Frank. "The Number of Linear, Directed, Rooted, and Connected Graphs." Transactions of the American Mathematical Society, Vol. 78, (1955), 445-463.

Harary, F., and Norman, R. Z. Graph Theory as a Mathematical Model in Social Science. Research Center for Group Dynamics, Monography No. 2. Ann Arbor, Michigan: University of Michigan, 1963.

Harary, F., and Norman, R. Z. "The Dissimilarity of Husimi Trees." Annals of Mathematics, Vol. 58, No. 1, (1953), 134-141.

Harary, Frank, and Norman, Robert Z. The Theory of Finite Graphs. Reading, Massachusetts: Addison-Wesley Publishing Company, 1962.

Harary, Frank, and Prins, G. "The Block-Cutpoint-Tree of a Graph." Publicationes Mathematicae, Vol. 13, (1966), 103-107.

Harary, F., and Trauth, C. A., Jr. "Connectedness of Products of Two Directed Graphs." SIAM Journal on Applied Mathematics, Vol. 14, No. 2, (1966), 250-254.

Harary, F., and Tutte, W. T. "The Number of Plane Trees with a Given Partition." Mathematika, Vol. 11, No. 22, (1964), 99-101.

Harary, F., and Uhlenbeck, G. E. "On the Number of Husimi Trees. I." Proceedings of the National Academy of Sciences, Vol. 39, No. 1, (1953), 315.

Hedetniemi, Stephen. "Some Interpolation Theorems for Partitions of Graphs." Technical Report 03105-47-T. Ann Arbor: The University of Michigan, Office of Research Administration, March 1967.

Hoffman, A. J. "On the Exceptional Case in a Characterization of the Arcs of a Complete Graph." IBM Journal of Research and Development, Vol. 4, No. 5, (1961), 487-496.

Hoffman, A. J. "On the Line Graph of a Projective Plane." Proceedings of the American Mathematical Society, Vol. 16, No. 2, (1965), 297-302.

Hoffman, A. J., and McAndrew, M. H. "The Polynomial of a Directed Graph." Proceedings of the American Mathematical Society, Vol. 16, No. 2, (1965), 303-309.

Hoffman, A. J., and Ray-Chaudhuri, D. K. "On the Line Graph of a Finite Affine Plane." Canadian Journal of Mathematics, Vol. 17, No. 5, (1965), 687-694.

Horton, Frank E. ed. Geographic Studies of Urban Transportation and Network Analysis. Department of Geography, Studies in Geography, No. 16, Evanston, Illinois: Northwestern University, 1968.

Huff, D. F. "A Topological Model of Consumer Space Preferences." Papers and Proceedings of the Regional Science Association, Vol. 6, (1960), 159-173.

Husain, Taqdir. The Open Mapping and Closed Graph Theorems in Topological Vector Spaces. Oxford: Clarendon Press, 1965.

Johnson, Ellis L. "Networks and Basic Solutions." Operations Research, Vol. 14, No. 4, (1966), 619-623.

Kamae, T. "A Graph-Theoretical Proof of an Adjacency Property of Major Submatrices." SIAM Journal on Applied Mathematics, Vol. 15, No. 6, (1967), 1390-1399.

Kamae, T. "Graph-Theoretical Properties of Major Submatrices." Coordinated Science Laboratory, Report R-326. Urbana, Illinois: University of Illinois, November 1966.

Kamae, T. "The Existence and Generation of a Hamilton Circuit in a Tree Graph." Ph.D. Thesis, Urbana, Illinois: University of Illinois, 1966.

Kansky, Karel J. The Structure of Transportation Networks. Department of Geography, Research Paper No. 64. Chicago: University of Chicago, 1963.

Katz, Leo. "A New Status Index Derived From Sociometric Analysis." Psychometrika, Vol. 18, No. 1, (1953), 39-43.

Kelly, J. B., and Kelly, L. M. "Paths and Circuits in Critical Graphs." American Journal of Mathematics, Vol. 76, (1954), 786-792.

Kemeny, J. G., and Snell, J. L. Mathematical Models in the Social Sciences. New York: Ginn and Co., 1962.

König, Dénes. Theorie der Endlichen und Unendlichen Graphen. New York: Chelsea Publishing Co., 1950.

Luce, R. D. "Connectivity and Generalized Cliques in Sociometric Group Structure." Psychometrika, Vol. 15, No. 2, (1950), 169-190.

Luce, R. D., and Perry, A. D. "A Method of Matrix Analysis of Group Structure." Psychometrika, Vol. 14, No. 1, (1949), 95-116.

Marble, D. F. NODAC--A Computer Program for the Computation of Two Simple Node Accessibility Measures in Networks. Earth Sciences Computer Study, Technical Report No. 10. Evanston, Illinois: Northwestern University, 1965.

Mason, S. J. "Feedback Theory--Same Properties of Signal Flow Graphs." Proceedings of the IRE, Vol. 44, No. 7, (1956), 920-926.

Maunsell, F. G. "A Note on Tutte's Paper 'The Factorization of Linear Graphs.' ". Journal of the London Mathematical Society, Vol. 27, (1952), 127-128.

Mayeda, W. "Terminal and Branch Capacity Matrices of a Communication Net." IRE Transactions on Circuit Theory, Vol. CT-7, (1960), 261-269.

Medvedkov, Yu. V. "An Application of Topology in Central Place Analysis." Papers of the Regional Science Association, Vol. 20, (1968), 77-84.

Miehle, William. "Link-Length Minimization in Networks." Operations Research, Vol. 6, No. 2, (1958), 232-243.

Minty, G. J. "Monotone Networks." Proceedings of the Royal Society, Series A, Mathematical and Physical Sciences, Vol. 257, No. 1288, (1960), 194-212.

Nash-Williams, C. St. J. A. "Decomposition of Graphs into Two-Way Infinite Paths." Canadian Journal of Mathematics, Vol. 15, No. 3, (1963), 479-485.

Nash-Williams, C. St. J. A. "Edge-Disjoint Spanning Trees of Finite Graphs." Journal of the London Mathematical Society, Vol. 36, No. 144, (1961), 445-450.

Nettleton, R. E., Goldberg, K., and Green, M. S. "Dense Subgraphs and Connectivity." Canadian Journal of Mathematics, Vol. 11, No. 2, (1959), 262-288.

Neville, E. H. "The Codifying of Tree-Structure." Proceedings of the Cambridge Philosophical Society, Vol. 49, (1953), 381-385.

Nikolai, Paul J. "Permanents of Incidence Matrices." Mathematical Computation, Vol. 14, (1960), 262-266.

Norman, R. Z. "On the Number of Linear Graphs with Given Blocks." Ph.D. dissertation, University of Michigan, 1954.

Nystuen, John D., and Dacey, Michael F. "A Graph Theory Interpretation of Nodal Regions." Papers and Proceedings of the Regional Science Association, Vol. 7, (1961), 29-42.

Ore, Oystein. "Graphs and Matching Theorems." Duke Mathematical Journal, Vol. 22, (1955), 625-639.

Ore, Oystein. Graphs and Their Uses. New York: Random House, Inc., 1963.

Ore, O. "Studies in Directed Graphs, I." Annals of Mathematics, Vol. 63, No. 3, (1956), 383-406.

Ore, O. "Studies on Directed Graphs, II." Annals of Mathematics, Vol. 64, No. 1, (1956), 142-153.

Otter, R. "The Number of Trees." Annals of Mathematics, Vol. 49, No. 3, (1948), 583-599.

Ponstein, J. "Matrix Description of Networks." Journal of SIAM, Vol. 9, No. 2, (1961), 233-268.

Prihar, Z. "Topological Properties of Telecommunication Networks." Proceedings of the IRE, Vol. 44, No. 7, (1956), 927-933.

Quandt, Richard E. "Models of Transportation and Optimal Network Construction." Journal of Regional Science, Vol. 2, No. 1, (1960), 27-45.

Ray-Chaudhuri, D. K. "Characterization of Line Graphs." Mathematics Research Center, Technical Report No. 642. Madison: The University of Wisconsin, April 1966.

Reid, K. B. "Connectivity in Products of Graphs." SIAM Journal on Applied Mathematics, Vol. 18, No. 3, (1970), 645-651.

Riordan, John, and Shannon, C. E. "The Number of Two-Terminal Series-Parallel Networks." Journal of Mathematics and Physics, Vol. 21, (1942), 83-93.

Robacker, J. T. "On Network Theory." Research Memorandum 1498. Santa Monica, California: The RAND Corporation, May 1955.

Rado, R. "Factorization of Even Graphs." Quarterly Journal of Mathematics, Vol. 20, (1949), 95-104.

Ross, Ian C., and Harary, Frank. "On the Determination of Redundancies in Sociometric Chains." Psychometrika, Vol. 17, No. 2, (1952), 195-208.

Rothschild, Bruce. "The Decomposition of Graphs into a Finite Number of Paths." Canadian Journal of Mathematics, Vol. 17, No. 3, (1965), 468-479.

Ryser, H. J. "Matrices of Zeros and Ones." Bulletin of the American Mathematical Society, Vol. 66, No. 5, (1960), 442-464.

Scott, Allen J. "An Integer Program for the Optimization of a System of Chromatic Graphs." Journal of Regional Science, Vol. 7, No. 2, supplement (1967), 291-296.

Scott, A. J. "A Programming Model of an Integrated Transportation Network." Papers of the Regional Science Association, Vol. 19, (1967), 215-222.

Scott, Allen J. "Location-Allocation Systems: A Review." Geographical Analysis, Vol. 11, No. 2, (1970), 95-119.

Senior, J. K. "Partitions and Their Representative Graphs." American Journal of Mathematics, Vol. 73, (1951), 663-689.

Seshu, Sundaram, and Reed, Myril B. Linear Graphs and Electrical Networks. Reading, Massachusetts: Addison-Wesley Publishing Co., 1961.

Shimbel, Alfonso. "Applications of Matrix Algebra to Communications Nets." Bulletin of Mathematical Biophysics, Vol. 13, (1951), 165-178.

Shimbel, A. "Structure in Communication Nets." Proceedings of the Symposium on Information Networks. New York: Polytechnic Institute of Brooklyn, 1954.

Shimbel, Alfonso. "Structural Parameters of Communication Networks." Bulletin of Mathematical Biophysics, Vol. 15, (1953), 501-507.

Slepian, Paul. Mathematical Foundations of Network Analysis. Vol. 16 of Springer Tracts in Natural Philosophy. Edited by B. D. Coleman. Berlin: Springer-Verlag, 1968.

Tan, T. "Road Networks in an Expanding Circular City." Operations Research, Vol. 14, No. 4, (1966), 607-613.

Tutte, W. T. "A Short Proof of the Factor Theorem for Finite Graphs." Canadian Journal of Mathematics, Vol. 6, (1954), 347-352.

Tutte, W. T. Connectivity in Graphs. Toronto: University of Toronto Press, 1966.

Tutte, W. T. "The Factorization of Linear Graphs." Journal of the London Mathematical Society, Vol. 22, No. 86, (1947), 107-111.

Tutte, W. T. "The Factorization of Locally Finite Graphs." Canadian Journal of Mathematics, Vol. 2, No. 1, (1950), 44-49.

Tutte, W. T. "The 1-Factors of Oriented Graphs." Proceedings of the American Mathematical Society, Vol. 4, (1953), 22-931.

Tutte, W. T. "The Factors of Graphs." Canadian Journal of Mathematics, Vol. 4, (1952), 314-318.

Ulrich, John W. "A Characterization of Planar Oriented Graphs." SIAM Journal on Applied Mathematics, Vol. 18, No. 2, (1970), 364-371.

Urquhart, Robert J. "Degree Constrained Subgraphs of Linear Graphs." Systems Engineering Laboratory, Technical Report SEL-67-12. Ann Arbor: The University of Michigan, May 1967.

Vadnal, A. "The Location of the Communication Network in a Circle." Paper presented at the European Economic Congress, 1958.

Walkup, David W. "The Number of Planar Trees." Mathematics Research Laboratory, Mathematical Note No. 624. Boeing Scientific Research Laboratories, September 1969.

Wang, Peter C. C. "On Incident Matrices." Department of Statistics and Probability, Technical Report No. 18. East Lansing: Michigan State University, August 1967.

Whitney, Hassler. "A Set of Topological Invariants for Graphs." American Journal of Mathematics, Vol. 55, No. 2, (1933), 231-235.

Whitney, Hassler. "Congruent Graphs and the Connectivity of Graphs." American Journal of Mathematics, Vol. 54, (1932), 150-168.

Whitney, Hassler. "Non-Separable and Planar Graphs." Transactions of the American Mathematical Society, Vol. 34, (1932), 339-362.

Whitney, Hassler. "On the Classification of Graphs." American Journal of Mathematics, Vol. 55, No. 2, (1933), 236-244.

Whitney, Hassler. "Planar Graphs." Fundamenta Mathematicae, Vol. 21, (1933), 73-84.

Whitney, Hassler. "Two-Isomorphic Graphs." American Journal of Mathematics, Vol. 55, No. 2, (1933), 245-254.

Wollmer, Richard. "Removing Arcs From a Network." Operations Research, Vol. 12, No. 6, (1964), 934-940.

II. NETWORK FLOWS

Appelgren, Leif H. "A Column Generation Algorithm for a Ship Scheduling Problem." Transportation Science, Vol. 3, No. 1, (1969), 53-68.

Avondo-Bodino, Giuseppe. Economic Applications of the Theory of Graphs. New York: Science Publishers, 1962.

Beckenbach, Edwin F. "Network Flow Problems." Chapter 12. Applied Combinatorial Mathematics. New York: John Wiley and Sons, Inc., 1964, 348-365.

Beckman, Martin. "On the Theory of Traffic Flow in Networks." Traffic Quarterly, Vol. 21, No. 1, (1967), 109-118.

Berge, Claude. The Theory of Graphs and Its Applications. Translated by Alison Doig. New York: John Wiley and Sons, Inc., 1962.

Berge, Claude, and Ghouila-Houri, A. Programming, Games and Transportation Networks. New York: John Wiley and Sons, Inc., 1965.

Boldyreff, Alexander W. "Determination of the Maximal Steady State Flow of Traffic Through a Railroad Network." Research Memorandum 1532. Santa Monica, California: The RAND Corporation, August 1955. Also in Operations Research, Vol. 3, No. 4, (1955), 443-465.

Busacker, R. G., and Gowen, P. J. A Procedure for Determining a Family of Minimum Cost Network Flow Patterns. Operations Research Office, ORO-TP-15, November 1960.

Busacker, Robert G., and Saaty, Thomas L. Finite Graphs and Networks: An Introduction with Applications. New York: McGraw-Hill Book Co., 1965.

Chen, W. "On Flow Graph Solutions of Linear Algebraic Equations." SIAM Journal on Applied Mathematics, Vol. 15, No. 1, (1967), 136-142.

Chen, W. "The Inversion of Matrices by Flow Graphs." Journal of SIAM, Vol. 12, No. 3, (1964), 676-685.

Cherry, E. Colin. "Generalized Concept of Networks." Proceedings of the Symposium on Information Networks. New York: Polytechnic Institute of Brooklyn, 1954, 175-184.

Dantzig, George B., and Johnson, David L. "Maximum Payloads per Unit Time Delivered Through an Air Network." Operations Research, Vol. 12, No. 2, (1964), 230-236.

Dantzig, G. B., Blattner, W. O. and Rao, M. R. "Finding a Cycle in a Graph with Minimum Cost to Time Ratio with Application to a Ship Routing Problem." Operations Research House, Technical Report No. 66-1. Stanford, California: Stanford University, November 1966.

Dantzig, G. B., and Ramser, J. H. "The Truck Dispatching Problem." Management Science, Vol. 6, No. 1, (1959), 80-91.

Desler, J. F., and Hakimi, S. L. "A Graph-Theoretic Approach to a Class of Integer-Programming Problems." Operations Research, Vol. 17, No. 6, (1969), 1017-1033.

Durbin, E. P., and Kroenke, D. M. "The Out-of-Kilter Algorithm: A Primer." Research Memorandum 5472-PR. Santa Monica, California: The RAND Corporation, December 1967.

Eastman, Willard L. "A Note on the Multi-Commodity Warehouse Problem." Management Science, Vol. 5, No. 3, (1959), 327-331.

Elias, P., Feinstein, A., and Shannon, C. E. "A Note on the Maximum Flow Through a Network." IRE Transactions, Information Theory, Vol. 2, (1956), 117-119.

Elmaghraby, Salah E. "Sensitivity Analysis of Multi-Terminal Flow Networks." Operations Research, Vol. 12, No. 5, (1964), 680-688.

Fiedler, Miroslav, ed. Theory of Graphs and Its Applications. Proceedings of the Symposium held in Smolence, June 1963. Prague: Publishing House of the Czechoslovak Academy of Sciences, 1964.

Flament, Claude. Applications of Graph Theory to Group Structure. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1963.

Ford, L. R., Jr. "Network Flow Theory." Paper P-923. Santa Monica, California: The RAND Corporation, August 1956.

Ford, L. R., Jr., and Fulkerson, D. R. "A Primal-Dual Algorithm for the Capacitated Hitchkock Problem." Paper P-827. Santa Monica, California: The RAND Corporation, September 1956. Also in Naval Research Logistics Quarterly, Vol. 4, No. 1, (1957), 47-54.

Ford, L. R., Jr., and Fulkerson, D. R. "A Simple Algorithm for Finding Maximal Network Flows and an Application to the Hitchcock Problem." Canadian Journal of Mathematics, Vol. 9, No. 2, (1957), 210-218.

Ford, L. R., Jr., and Fulkerson, D. R. "A Suggested Computation for Maximal Multi-Commodity Network Flows." Management Science, Vol. 5, No. 1, (1958), 97-101.

Ford, L. R., Jr., and Fulkerson, D. R. "Constructing Maximal Dynamic Flows from Static Flows." Operations Research, Vol. 6, No. 3, (1958), 419-433.

Ford, L. R., Jr., and Fulkerson, D. R. "Construction of Maximal Dynamic Flows in Networks." Paper P-1079. Santa Monica, California: The RAND Corporation, May 1957.

Ford, L. R., Jr., and Fulkerson, D. R. "Dynamic Network Flow." Paper P-967. Santa Monica, California: The RAND Corporation, October 1956.

Ford, L. R., Jr., and Fulkerson, D. R. Flows in Networks. Princeton, New Jersey: Princeton University Press, 1962.

Ford, L. R., Jr., and Fulkerson, D. R. "Maximal Flow Through a Network." Canadian Journal of Mathematics, Vol. 8, No. 3, (1956), 399-404.

Ford, L. R., Jr., and Fulkerson, D. R. "Network Flow and Systems of Representatives." Research Memorandum 1977. Santa Monica, California: The RAND Corporation, September 1957.

Ford, L. R., Jr., and Fulkerson, D. R. "Solving the Transportation Problem." Management Science, Vol. 3, No. 1, (1956), 24-32.

Frank, Howard and Frisch, Ivan. "Network Analysis." Scientific American, Vol. 223, No. 1, (1970), 94-105.

Frank H., and Frisch, I. T. Communications, Transmission and Transportation Networks. Reading, Massachusetts: Addison-Wesley Publishing Co., Inc., forthcoming.

Fulkerson, D. R. "A Network Flow Computation for Project Cost Curves." Paper P-1947. Santa Monica, California: The RAND Corporation, March 1960. Also in Management Science, Vol. 7, No. 2, (1961), 167-178.

Fulkerson, D. R. "An Out-of-Kilter Method for Minimal-Cost Flow Problems." Paper P-1825. Santa Monica, California: The RAND Corporation, October 1959. Revised January 1960. Also in Journal of SIAM, Vol. 9, No. 1, (1961), 18-27.

Fulkerson, D. R. "Flow Networks and Combinatorial Operations Research." Research Memorandum 3378-PR. Santa Monica, California: The RAND Corporation, October 1962. Also in American Mathematical Monthly, Vol. 73, No. 2, (1966), 115-138.

Fulkerson, D. R. "Hitchcock Transportation Problem." Paper P-890. Santa Monica, California: The RAND Corporation, July 1956.

Fulkerson, D. R. "Increasing the Capacity of a Network.: The Parametric Budget Problem." Management Science, Vol. 5, No. 4, (1959), 472-483.

Fulkerson, D. R., and Dantzig, G. B. "Computation of Maximal Flows in Networks." Naval Research Logistics Quarterly, Vol. 2, (1955), 277-283.

Fulkerson, D. R., Glicksberg, I., and Gross, O. "A Production Line Assignment Problem." Research Memorandum 1102. Santa Monica, California: The RAND Corporation, May 1953.

Gale, David. "A Theorem on Flows in Networks." Research Memorandum 1737. Santa Monica, California: The RAND Corporation, June 1956. Also in Pacific Journal of Mathematics, Vol. 7, No. 2, (1957), 1073-1082.

Gale, David. "Transient Flows in Networks." Research Memorandum 2152. Santa Monica, California: The RAND Corporation, April 1958.

Garrison, William L., and Marble, Duane F. "Analysis of Highway Networks: A Linear Programming Formulation." Highway Research Board. Proceedings of the 37th Annual Meeting, NAS-NRC Publication, No. 612, Washington, D.C., January 6-10, 1958.

Gautier, Howard L. "Transportation and the Growth of the Sao Paulo Economy." Journal of Regional Science, Vol. 8, No. 1, (1968), 77-94.

Gomory, Ralph E., and Hu, T. C. "An Application of Generalized Linear Programming to Network Flows." Journal of SIAM, Vol. 10, No. 2, (1962), 260-283.

Gomory, Ralph E., and Hu, T. C. "Multi-Terminal Network Flows." Journal of SIAM, Vol. 9, No. 4, (1961), 551-570.

Gupta, R. P. "On Flows in Pseudo-Symmetric Networks." SIAM Journal on Applied Mathematics, Vol. 14, No. 2, (1966), 215-225.

Haggett, Peter. Locational Analysis in Human Geography. London: Edward Arnold, Ltd., 1965, 236-240, 251-253.

Haggett, Peter. "Network Models in Geography." Models in Geography, Edited by Richard J. Chorley and Peter Haggett. London: Methuen and Co., Ltd., 1967.

Harary, F. A Seminar on Graph Theory. New York: Holt, Rinehart and Winston, 1967.

Harary, F., and Norman, R. Z. Graph Theory as a Mathematical Model in Social Science. Research Center for Group Dynamics, Monography No. 2. Ann Arbor, Michigan: University of Michigan, 1963.

Harary, Frank, and Norman, Robert Z. The Theory of Finite Graphs. Reading, Massachusetts: Addison-Wesley Publishing Co., 1962.

Hooi-Tong, Log. "On a Class of Directed Graphs with an Application to Traffic Flow Problems." Operations Research, Vol. 18, No. 1, (1970), 87-94.

Horton, Frank E. ed. Geographic Studies of Urban Transportation and Network Analysis. Department of Geography, Studies in Geography No. 16. Evanston, Illinois: Northwestern University, 1968.

Hu, T. C. "Minimum Convex-Cost Flows in Networks." Research Memorandum 4265. Santa Monica, California: The RAND Corporation, November 1964.

Hu, T. C. "Multi-Commodity Network Flows." Operations Research, Vol. 11, No. 3, (1963), 344-360.

Hu, T. C. "Recent Advances in Network Flows." Mathematics Research Center, Technical Summary Report, No. 753. Madison: The University of Wisconsin, June 1967.

Huggins, William H. "Flow-Graph Representation of Systems." Operations Research and Systems Engineering. Edited by C. D. Flagle, W. H. Huggins, and R. H. Roy. Baltimore: The Johns Hopkins Press, 1960.

Ivanescu, Peter L. "Some Network Flow Problems Solved with Pseudo-Boolean Programming." Operations Research, Vol. 13, No. 3, (1965), 388-399.

Jacobs, W. "The Caterer Problem." Naval Research Logistics Quarterly, Vol. 1, (1954), 154-165.

Jewell, William S. "Multi-Commodity Network Solutions." Operations Research Center 66-23. Berkeley: University of California, September 1966.

Johnson, David L. "Network Flow Theory and Its Application to Air Transport Problems." Mathematics Research Laboratory, Mathematical Note No. 218. Boeing Scientific Research Laboratories, July 1960.

Kemeny, J. G., and Snell, J. L. Mathematical Models in the Social Sciences. New York: Ginn and Co., 1962.

King, L., et al. "Optimal Transportation Patterns of Coal in the Great Lakes Region." Forthcoming in Economic Geography.

Klein, Morton. "A Primal Method for Minimal Cost Flows with Applications to the Assignment and Transportation Problems." Management Science, Vol. 14, No. 3, (1968), 205-220.

König, Dénes. Theorie der Endlichen und Unendlichen Graphen. New York: Chelsea Publishing Co., 1950.

Kuhn, H. W. "The Hungarian Method for the Assignment Problem." Naval Research Logistics Quarterly, Vol. 2, (1955), 83-97.

Mayeda, W. "Terminal and Branch Capacity Matrices of a Communication Net." IRE Transactions on Circuit Theory, Vol. CT-7, (1960), 261-269.

Mueller-Merbach, Heiner. "An Improved Starting Algorithm for the Ford-Fulkerson Approach to the Transportation Problem." Management Science, Vol. 13, No. 1, (1966), 97-104.

Ore, Oystein. Graphs and Their Uses. New York: Random House, Inc., 1963.

Pollack, M. "The Maximum Capacity Route Through a Network." Operations Research, Vol. 8, No. 5, (1960), 733-736.

Prager, William. "On the Caterer Problem." Management Science, Vol. 3, No. 1, (1956), 15-23.

Robacker, J. T. "Min-Max Theorems on Shortest Chains and Disjunct Cuts of a Network." Research Memorandum 1660. Santa Monica, California: The RAND Corporation, January 1956.

Rothfarb, B., and Frisch, I. T. "On the 3-Commodity Flow Problem." SIAM Journal of Applied Mathematics, Vol. 17, No. 1, (1969), 46-58.

Rothschild, B., and Whinston, A. "Feasibility of Two Commodity Network Flows." O.N.R. Research Memorandum No. 3. Charlottesville: University of Virginia, October 1965.

Rothschild, B., and Whinston, A. "Multi-Commodity Network Flows with Multiple Sources and Sinks." Institute for Research in the Behavorial, Economic and Management Sciences, Paper No. 193. Lafayette, Indiana: Purdue University, October 1967.

Rothschild, B., and Whinston, A. "Maximal Two-Way Flows." O.N.R. Research Memorandum No. 5. Charlottesville: University of Virginia, June 1966.

Rothschild, B., and Whinston, A. "On Two Commodity Network Flows." O.N.R. Research Memorandum No. 2. Charlottesville: University of Virginia, October 1965. Also in Operations Research, Vol. 14, No. 3, (1966), 377-387.

Rothschild, B., and Whinston, A., and Kent, J. "Computing Two-Commodity Flows." Western Management Science Institute, Working Paper No. 115, Los Angeles: University of California, April 1967.

Russell, A. H. "Cash Flows in Networks." Management Science, Vol. 16, No. 5, (1969), 357-373.

Scott, Allen J. "Location-Allocation Systems: A Review." Geographical Analysis, Vol. 11, No. 2, (1970), 95-119.

Seshu, Sundaram, and Reed, Myril B. Linear Graphs and Electrical Networks. Reading, Massachusetts: Addison-Wesley Publishing Co., 1961.

Shapley, L. S. "On Network Flow Functions." Research Memorandum 2338. Santa Monica, California: The RAND Corporation, March 1959.

Slepian, Paul. Mathematical Foundations of Network Analysis. Vol. 16 of Springer Tracts in Natural Philosophy. Edited by B. D. Coleman. Berlin: Springer-Verlag, 1968.

Tomlin, J. A. "Minimum-Cost Multi-Commodity Network Flows." Operations Research, Vol. 14, No. 1, (1966), 45-51.

Wollmer, R. D. "Maximizing Flow Through a Network with Node and Arc Capacities." Research Memorandum 5383-PR. Santa Monica, California: The RAND Corporation, July 1967. Also in Transportation Science, Vol. 2, No. 3, (1968), 213-232.

Wollmer, Richard D. "Stochastic Sensitivity Analysis of Maximum Flow and Shortest Route Networks." Management Science, Vol. 14, No. 9, (1968), 551-564.

Zangwill, Willard I. "Minimum Concave Cost Flows in Certain Networks." Management Science, Vol. 14, No. 7, (1968), 429-450.

III. RANDOM GRAPHS

Austin, T. L., et al. "The Number of Components in Random Linear Graphs." The Annals of Mathematical Statistics, Vol. 30, No. 3, (1959), 747-754.

Baecker, R. M. "Planar Representation of Complex Graphs." Lincoln Laboratory, Technical Note 1967-1. Lexington: Massachusetts Institute of Technology, February 1967.

Busacker, Robert G., and Saaty, Thomas L. Finite Graphs and Networks: An Introduction with Applications. New York: McGraw-Hill Book Co., 1965.

Erdös, P. "Graph Theory and Probability." Canadian Journal on Mathematics, Vol. 11, No. 1, (1959), 34-38.

Erdös, P. "Some Remarks on the Theory of Graphs." Bulletin of the American Mathematical Society, Vol. 53, (1947), 292-294.

Erdös, P., and Renyi, A. "On Random Graphs I." Publicationes Mathematicae, Vol. 6, (1959), 290-297.

Erdös, P., and Renyi, A. "On the Evolution of Random Graphs." Publications of the Mathematical Institute of the Hungarian Academy of Sciences, Vol. 5, Series A, Fasc. 1-2, (1960), 17-61.

Erdös, P., and Stone, A. H. "On the Structure of Linear Graphs." Bulletin of the American Mathematical Society, Vol. 52, (1946), 1087-1091.

Ford, G. W., and Uhlenbeck, G. E. "Combinatorial Problems in the Theory of Graphs. I." Proceedings of the National Academy of Science, Vol. 42, No. 3, (1956), 122-128.

Frank, H. "Optimum Locations on a Graph with Probabilistic Demands." Operations Research, Vol. 14, No. 3, (1966), 409-421.

Friedman, Bernard. "An Approach to Nonlinear Networks." Mathematics Research Laboratory, Mathematical Note No. 325. Boeing Scientific Research Laboratories, September 1963.

Gilbert, E. N. "Enumeration of Labelled Graphs." Canadian Journal of Mathematics, Vol. 8, No. 3, (1956), 405-411.

Gilbert, E. N. "Random Graphs." The Annals of Mathematical Statistics, Vol. 30, No. 3, (1959), 1141-1144.

Gilbert, E. N. "Random Minimal Trees." Journal of SIAM, Vol. 13, No. 2, (1965), 376-387.

Gilbert, E. N. "Random Plane Networks." Journal of SIAM, Vol. 9, No. 4, (1961), 533-543.

Harary, Frank. "Unsolved Problems in the Enumeration of Graphs." Publications of the Mathematical Institute of the Hungarian Academy of Sciences, Vol. 5, Series A, Fasc. 1-2, (1959), 63-95.

Renyi, A. "On Connected Graphs, I." Publications of the Mathematical Institute of the Hungarian Academy of Sciences, Vol. 4, Fasc. 2, (1959), 385-388.

Renyi, A. "Some Remarks on the Theory of Trees." Publications of the Mathematical Institute of the Hungarian Academy of Sciences, Vol. 4, Fasc. 1, (1959), 73-83.

Riddell, R. J., Jr., and Uhlenbeck, G. E. "On the Theory of the Virial Development of the Equation of State of Monoatomic Gases." The Journal of Chemical Physics, Vol. 21, No. 11, (1953), 2056-2064.

BEST COPY AVAILABLE

IV. NETWORK DESIGN

Beckmann, M. "Principles of Optimum Location for a Transportation Network." Paper presented at NAS-NRS Symposium on Quantitative Problems in Geography, 1960.

Bergsman, Joel. "Comments on Quandt and Baumol's Demand Model for Abstract Transport Modes." Journal of Regional Science, Vol. 7, No. 1, (1967), 83-85.

Bhagat, D. G. "Regional Concept for Highway Planning--The Web and Lattice Pattern." Journal of the Indian Roads Congress, Vol. 24, (1960), 629-666.

Black, William R. Growth of the Railway Network of Maine." Department of Geography, Discussion Paper No. 5. Iowa City: The University of Iowa.

Boyce, David E. The Generation of Synthetic Transportation Networks. Contract DA 44-177-TC-685. Fort Eustis, Virginia: U. S. Army Transportation Research Command, 1963.

Burton, Ian. "Accessibility in Northern Ontario: An Application of Graph Theory to a Regional Highway Network." Unpublished Research Paper.

Cowan, P., and Fine, D. "On the Number of Links in a System." Regional Studies, Vol. 3, No. 3, (1969), 235-242.

Creighton, Roger L., Hock, Irving, and Schneider, Morton. "The Optimum Spacing of Arterials and of Expressways." Traffic Quarterly, Vol. 13, No. 4, (1959), 477-494.

Farbey, B. A., Land, A. H., and Murchland, J. D. "The Cascade Algorithm for Finding the Minimum Distances on a Graph." Transport Network Theory Unit. London: London School of Economics, October 1966.

Ford, L. R., Jr., and Fulkerson, D. R. "A Simple Algorithm for Finding Maximal Network Flows and an Application to the Hitchcock Problem." Canadian Journal of Mathematics, Vol. 9, No. 2, (1957), 210-218.

Fulkerson, D. R. "Flow Networks and Combinatorial Operations Research." Research Memorandum 3378-PR. Santa Monica, California: The RAND Corporation, October 1962. Also in American Mathematical Monthly, Vol. 73, No. 2, (1966), 115-138.

Garrison, W. L., and Marble, D. F. The Structure of Transportation Networks. Washington, D.C.: U. S. Department of Commerce, Office of Technical Services, 1961. (Report to the U. S. Army Transportation Research Command under contract DA-44-177-TC-685.)

Garrison, W. L., and Marble, D. F. Approaches to the Development of a Forecasting Capability for National and Regional Transportation Systems. Contract DA 44-177-TC-685. Fort Eustis, Virginia: U. S. Army Transportation Research Command, 1962.

Gomory, Ralph E., and Hu, T. C. "An Application of Generalized Linear Programming to Network Flows." Journal of SIAM, Vol. 10, No. 2, (1962), 260-283.

Haggett, Peter. Locational Analysis in Human Geography. London: Edward Arnold, Ltd., 1965, 236-240, 251-253.

Haggett, Peter. "Network Models in Geography." Models in Geography. Edited by Richard J. Chorley and Peter Haggett. London: Methuen and Co., Ltd., 1967.

Hakimi, S. L. "Optimum Distribution of Switching Centers in a Communication Network and Some Related Graph Theoretic Problems." Operations Research, Vol. 13, No. 3, (1965), 462-475.

Hakimi, S. L. "Optimum Locations of Switching Centers and the Absolute Centers and Medians of a Graph." Operations Research, Vol. 12, No. 3, (1964), 450-459.

Halder, Alan K. "The Method of Competing Links." Transportation Science, Vol. 4, No. 1, (1970), 36-51.

Kalaba, R. E., and Juncosa, M. L. "Optimal Design and Utilization of Communication Networks." Management Science, Vol. 3, No. 1, (1956), 33-44.

Klein, Morton. "A Primal Method for Minimal Cost Flows with Applications to the Assignment and Transportation Problems." Management Science, Vol. 14, No. 3, (1968), 205-220.

Peterson, James M. "Freeway Spacing in an Urban Freeway System." Transactions of the American Society of Civil Engineers, Vol. 126, Part 4, (1961), 383-393.

Quandt, Richard E. "Models of Transportation and Optimal Network Construction." Journal of Regional Science, Vol. 2, No. 1, (1960), 27-45.

Quandt, R. E., and Baumol, W. J. "The Demand for Abstract Transport Modes: Theory and Measurement." Journal of Regional Science, Vol. 6, (1966), 13-26.

Werner, Christian. "The Role of Topology and Geometry in Optimal Network Design." Papers of the Regional Science Association, Vol. 21, (1968), 173-189.

Wollmer, Richard D. "Algorithms for Targeting Strikes in Lines-of-Communication Networks." Operations Research, Vol. 18, No. 3, (1970), 497-515.

V. NETWORK ROUTING

Avondo-Bodino, Giuseppe. Economic Applications of the Theory of Graphs. New York: Science Publishers, 1962.

Bellman, Richard, and Kalaba, Robert. "On the Kth Best Policies." Journal of SIAM, Vol. 8, No. 4, (1960), 582-588.

Bellmore, M., and Nemhauser, G. L. "The Traveling Salesman Problem: A Survey." Operations Research, Vol. 16, No. 3, (1968), 538-558.

Berge, Claude. The Theory of Graphs and Its Applications. Translated by Alison Doig. New York: John Wiley and Sons, Inc., 1962.

Berman, E. B. "Resource Allocation in a PERT Network Under Continuous Activity Time-Cost Functions." Management Science, Vol. 10, No. 4, (1964), 734-745.

Blazek, J., and Koman, M. "A Minimal Problem Concerning Complete Plane Graphs." Theory of Graphs and Its Applications. Proceedings of the Symposium held in Smolence, Academic Press, New York, (1963), 113-117.

Busacker, Robert G., and Saaty, Thomas L. Finite Graphs and Networks: An Introduction with Applications. New York: McGraw-Hill Book Co., 1965.

Cayley, A. The Collected Mathematical Papers of A. Cayley. Cambridge, Massachusetts: Cambridge University Press, 1889-1897.

Clarke, S., Krikorian, A., and Rausen, J. "Computing the N Best Loopless Paths in a Network." Journal of SIAM, Vol. 11, No. 4, (1963), 1096-1102.

Dantzig, G. B. "On the Shortest Route Through a Network." Management Science, Vol. 6, No. 2, (1960), 187-190. Also in Linear Programming and Extensions, Princeton, New Jersey: Princeton University Press, 1963, 361-366.

Dantzig, George B. "All Shortest Routes in a Graph." Operations Research House, Technical Report No. 66-3. Stanford, California: Stanford University, November 1966.

Dantzig, George B., Blattner, W. O., and Rao, M. R. "All Shortest Routes from a Fixed Origin in a Graph." Operations Research House, Technical Report No. 66-2. Stanford, California: Stanford University, November 1966.

Dantzig, G. B., Fulkerson, R., and Johnson, J. "Solution of a Large-Scale Traveling-Salesman Problem." Operations Research, Vol. 2, No. 4, (1954), 393-410.

Dantzig, G. B., Fulkerson, D. R., and Johnson, S. M. "On a Linear Programming, Combinatorial Approach to the Traveling-Salesman Problem." Operations Research, Vol. 7, No. 1, (1959), 58-66.

Dantzig, G. B., and Ramser, J. H. "The Truck Dispatching Problem." Management Science, Vol. 6, No. 1, (1959), 80-91.

Dreyfus, Stuart E. "An Appraisal of Some Shortest-Path Algorithms." Operations Research, Vol. 17, No. 3, (1969), 395-412.

Durbin, E. P. "An Interdiction Model of Highway Transportation." Research Memorandum 4945-PR. Santa Monica, California: The RAND Corporation, May 1966.

Elmaghraby, Salah E. "On the Expected Duration of PERT Type Networks." Management Science, Vol. 13, No. 5, (1967), 299-306.

Farbey, B. A., Land, A. H., and Murchland, J. D. "The Cascade Algorithm for Finding ALL Shortest Distances in a Directed Graph." Management Science, Vol. 14, No. 1, (1968), 19-28.

Fiedler, Miroslav, ed. Theory of Graphs and Its Applications. Proceedings of the Symposium held in Smolence, June 1963. Prague: Publishing House of the Czechoslovak Academy of Sciences, 1964.

Flament, Claude. Applications of Graph Theory to Group Structures. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1963.

Flood, Merrill M. "The Traveling-Salesman Problem." Operations Research, Vol. 4, No. 1, (1956), 61-75.

Floyed, R. W. "Algorithm 97, Shortest Path." Communications of the ACM, Vol. 5, No. 6, (1962), 345.

Frank, H. "Optimum Locations on a Graph with Probabilistic Demands." Operations Research, Vol. 14, No. 3, (1966), 409-421.

Frank, H. "Shortest Paths in Probabilistic Graphs V." Operations Research, Vol. 17, No. 4, (1969), 583-599.

Garrison, W. L., and Marble, D. F. The Structure of Transportation Networks. Washington, D.C.: U. S. Department of Commerce, Office of Technical Services, 1961. (Report to the U. S. Army Transportation Research Command under contract DA-44-177-TC-685.)

Garrison, W. L., and Marble, D. F. A Prolegomenon to the Forecasting of Transportation. Washington, D.C.: U. S. Department of Commerce, 1965.

Greenberg, Harold, and Hegerich, Robert L. "A Branch Search Algorithm for the Knapsack Problem." Management Science, Vol. 16, No. 5, (1969), 327-332.

Haggett, Peter. Locational Analysis in Human Geography. London: Edward Arnold, Ltd., 1965, 236-40, 251-253.

Haggett, Peter. "Network Models in Geography." Models in Geography. Edited by Richard J. Chorley and Peter Haggett. London: Methuen and Co., Ltd., 1967.

Harary, F. A Seminar on Graph Theory. New York: Holt, Rinehart and Winston, 1967.

Harary, Frank, and Norman, Robert Z. The Theory of Finite Graphs. Reading, Massachusetts: Addison-Wesley Publishing Co., 1962.

Harary, F., and Norman, R. Z. Graph Theory as a Mathematical Model in Social Science. Research Center for Group Dynamics, Monography No. 2, Ann Arbor, Michigan: University of Michigan, 1963.

Harary, F., and Uhlenbeck, G. E. "On the Number of Husimi Trees, I." Proceedings of the National Academy of Sciences, U.S.A., Vol. 39, No. 1, (1953), 315.

Hardgrave, William W., and Nemhauser, George L. "On the Relation Between the Traveling-Salesman and the Longest-Path Problems." Operations Research, Vol. 10, No. 5, (1962), 647-657.

Hoffman, W., and Parley, R. "A Method for the Solution of the Nth Best Path Problem." Journal of ACM, Vol. 6, No. 4, (1959), 506-514.

Horton, Frank E. ed. Geographic Studies of Urban Transportation and Network Analysis. Department of Geography, Studies in Geography No. 16. Evanston, Illinois: Northwestern University, 1968.

Hu, T. C. Revised Matrix Algorithms for Shortest Paths." SIAM Journal on Applied Mathematics, Vol. 15, No. 1, (1967), 207-218.

Hu, T. C. "A Decomposition Algorithm for Shortest Paths in a Network." Mathematics Research Center, Technical Report No. 804. Madison: The University of Wisconsin, September 1967. Also in Operations Research, Vol. 16, No. 1, (1968), 91-102.

Kelley, J. E. "Critical Path Planning and Scheduling: Mathematical Basis." Operations Research, Vol. 9, No. 3, (1961), 296-320.

Klee, Victor. "A String Algorithm for Shortest Paths in a Directed Network." Operations Research, Vol. 12, No. 3, (1964), 428-432.

Kolesar, Peter J. "A Branch and Bound Algorithm for the Knapsack Problem." Management Science, Vol. 13, No. 9, (1967), 723-735.

König, Dénes. Theorie der Endlichen und Unendlichen Graphen. New York: Chelsea Publishing Co., 1950.

Kruskal, J. B., Jr. "On the Shortest Spanning Subtree of a Graph and the Traveling Salesman Problem." Proceedings of the American Mathematical Society, Vol. 7, No. 1, (1956), 48-50.

Kuhn, H. W. "The Hungarian Method for the Assignment Problem." Naval Research Logistics Quarterly, Vol. 2, (1955), 83-97.

Mayeda, W. "Generation of Trees and Complete Trees." Coordinated Science Laboratory Report R-284. Urbana, Illinois: University of Illinois, April 1966.

Miehle, William. "Link-Length Minimization in Networks." Operations Research, Vol. 6, No. 2, (1958), 232-243.

Mills, G. "A Decomposition Algorithm for the Shortest-Route Problem." Operations Research, Vol. 14, No. 2, (1966), 279-291.

Minty, G. J. "A Comment on the Shortest-Route Problem." Operations Research, Vol. 5, No. 5, (1957), 724.

Murchland, J. D. "A New Method for Finding ALL Elementary Paths in a Complete Directed Graph." LSE-TNT-22. London: London School of Economics, October 1965.

Murchland, J. D. "An Inductive Matrix Method for Finding ALL Shortest Paths in a Directed Graph." LSE-TNT-25. London: London School of Economics, March 1966.

Nash-Williams, C. St. J. A. "Edge-Disjoint Spanning Trees of Finite Graphs." Journal of the London Mathematical Society, Vol. 36, No. 144, (1961), 445-450.

Neville, E. H. The Codifying of Tree-Structure." Proceedings of the Cambridge Philosophical Society, Vol. 49, (1953), 381-385.

Norman, R. Z., and Rabin, M. O. "An Algorithm for a Minimum Cover of a Graph." Proceedings of the American Mathematical Society, Vol. 10, (1959), 315-319.

Otter, R. "The Number of Trees." Annals of Mathematics, Vol. 49, No. 3, (1948), 583-599.

Pollack, M. "The Maximum Capacity Route Through a Network." Operations Research, Vol. 8, No. 5, (1960), 733-736.

Pollack, M. "Solution of the Kth Best Route Through a Network-A Review." Journal of Mathematical Analysis and Application, Vol. 3, (1961), 547-559.

Pollack, Maurice. "The Kth Best Route Through a Network." Operations Research, Vol. 9, No. 4, (1961), 578-580.

Pollack, Maurice, and Wiebenson, Walter. "Solutions of the Shortest-Route Problem-A Review." Operations Research, Vol. 8, No. 2, (1960), 224-230.

Prim, R. C. "Shortest Connection Networks and Some Generalizations." Bell System Technical Journal, Vol. 36, No. 6, (1957), 1389-1401.

Rapaport, H., and Abramson, P. "An Analog Computer for Finding an Optimum Route Through a Communications Network." IRE Transactions on Communications Systems, Vol. CS-7, (1959), 37-42.

Ringer, Larry J. "Numberical Operators for Statistical PERT Critical Path Analysis." Management Science, Vol. 16, No. 2, (1969), 136-143.

Roberts, S. M., and Flores, Benito. "An Engineering Approach to the Traveling Salesman Problem." Management Science, Vol. 13, No. 3, (1966), 269-288.

Rothschild, Bruce. "The Decomposition of Graphs into a Finite Number of Paths." Canadian Journal of Mathematics, Vol. 17, No. 3, (1965), 468-479.

Sakarovitch, Michel. "The K Shortest Routes and the K Shortest Chains in a Graph." Operations Research Center 66-32. Berkeley: University of California, October 1966.

Sakarovitch, Michel. "The K Shortest Chains in a Graph." Transportation Research, Vol. 2, No. 1, (1968), 1-11.

Saksena, J. P., and Kumar, Santosh. "The Routing Problem with 'K' Specified Nodes." Operations Research, Vol. 14, No. 5, (1966), 909-913.

Scott, Allen, J. "Location-Allocation Systems: A Review." Geographical Analysis, Vol. 11, No. 2, (1970), 95-119.

Seshu, Sundaram, and Reed, Myril B. Linear Graphs and Electrical Networks. Reading, Massachusetts: Addison-Wesley Publishing Co., 1961.

Shapiro, Jeremy F. "Shortest Route Methods for Finite State Space Deterministic Dynamic Programming Problems." SIAM Journal on Applied Mathematics, Vol. 16, No. 6, (1966), 1232-1250.

Slepian, Paul. Mathematical Foundations of Network Analysis. Vol. 16 of Springer Tracts in Natural Philosophy. Edited by B. D. Coleman. Berlin: Springer-Veralg, 1968.

White, Leon S. "Shortest Route Models for the Allocations of Inspection Effort on a Production Line." Management Science, Vol. 15, No. 5, (1969), 249-259.

Wollmer, R. D. "Some Methods for Determing the Most Vital Link in a Railway Network." Research Memorandum 3321-ISA. Santa Monica, California: The RAND Corporation, April 1963.

Wollmer, Richard. "Removing Arcs From a Network." Operations Research, Vol. 12, No. 6, (1964), 934-940.

Wollmer, Richard D. "Stochastic Sensitivity Analysis of Maximum Flow and Shortest Route Networks." Management Science, Vol. 14, No. 9, (1968), 551-564.

COUNCIL OF PLANNING LIBRARIANS Exchange Bibliography #165

NETWORK ANALYSIS: A SELECTED BIBLIOGRAPHY.

Additional copies available from:

COUNCIL OF PLANNING LIBRARIANS
Post Office Box 229
Monticello, Illinois, 61856

for $3.00

- - - - - - - - - - - - - -